Contribution ID: **89** Contribution code: **PSB-9** Type: **Poster**

Cosmogenic 32Si as a potential tracer for the global marine silicon cycle processes: A review

Wednesday, 23 October 2024 17:35 (20 minutes)

Title: Cosmogenic 32Si as a potential tracer for the global marine silicon cycle processes: A review
Authors: Haoxiang Zhong,1 Peng ZHOU,2,3*LI Dongmei 2*
1Guangzhou Maritime University, Guangzhou 510725, PR China;
2South China Sea Ecological Center of Ministry of Natural Resources (MNR), Nansha Islands Coral Reef Ecosystem National Observation and Research Station, & Key Laboratory of Marine Environmental Survey Technology and Application of MNR, Guangzhou 510300, China;
3Southern Marine Science and Engineering Guangdong Laboratory (Zhuhai), Zhuhai, 519000) Corresponding authors. E-mail addresses: samzhou2@126.com (P. Zhou). Tel.: +862089111586 (P. Zhou); Fax: +862084457983.
†These authors contributed equally to this work.

Abstract: Silicon is the second most abundant element (27.7%) after oxygen in the Earth's crust. It plays an important role in regulating primary productivity and carbon cycling in the oceans. Cosmogenic 32Si (a half-life of approximately 150 years) is the only long-lived radioisotope, which can be produced by cosmic rays impinging on atmospheric 40Ar and falling as precipitation on lands (partly into oceans through runoff) and oceans. 32Si is taken up by siliceous organisms (e.g., diatoms), partly recycled, and partly eventually transported to the seafloor as biogenic silica (BSi). This paper summarizes 32Si and silicon cycling studies in nearshore (including estuaries), continental shelf waters, and the open ocean. Recent studies have demonstrated that 32Si can independently constrain diagenetic processes controlling Si storage in marine sediments. Biogenic silica (BSiopal) is rapidly altered toauthigenic clay phases (BSiclay) to variable extents depending on depositional environment. In tropical sediments, 32Si is in mineral rather than biogenic (reactive) silica pools used to constrain the silica cycle. Coastal reactive Si burial rates are likely 20-30% higher globally than previously estimated. Tropical and subtropical deltas store 3.5–3.9 Tmol/yr of Si as authigenic clay(BSiclay), and temperate proximal coastal zones store ˜1 Tmol/yr. Global sedimentary Si sink via reverse weathering reactions is 2 to 3 times the current estimates and exceeds the Southern Ocean siliceous ooze.
Keyword: silicon-32; a cosmic-ray-produced radioactive nuclide; global marine silicon cycle; oceanography
Funding: This research was funded by CAS Henan Industrial Technology Innovation & Incubation Center (2024123), by Science and Technology Development Foundation of South China Sea Bureau, Ministry of Natural Resorces of P. R. China (23YD03), the Fund of Key Laboratory of Global Change and Marine-Atmospheric Chemistry, Ministry of Natural Resources (MNR) (GCMAC202207).

Student Submission

No

Primary authors: 李, 冬梅 (南海生态中心); 仲, 皓想 (广州航海学院); 周, 鹏 (自然资源部南海生态中心)

Presenter: 仲, 皓想 (广州航海学院)

Session Classification: Poster Session B

Track Classification: Applications in Oceanography